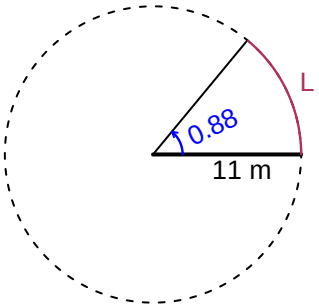
Name: Date:

Trig Final (Solution v38)

- You should have a calculator (like Desmos) and a unit-circle reference sheet.

Question 1

In the figure below, we see a circle and a central angle that subtends an arc. The radius is 11 meters. The angle measure is 0.88 radians. How long is the arc in meters?

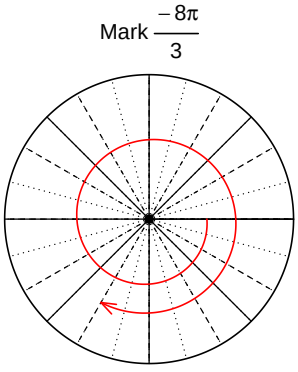


$$\theta = \frac{L}{r} \qquad r = \frac{L}{\theta} \qquad L = r\theta$$

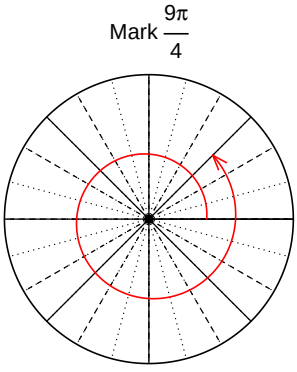
$L = 9.68$ meters.

Question 2

Consider angles $\frac{-8\pi}{3}$ and $\frac{9\pi}{4}$. For each angle, use a spiral with an arrow head to **mark** the angle on a circle below in standard position. Then, find **exact** expressions for $\cos\left(\frac{-8\pi}{3}\right)$ and $\sin\left(\frac{9\pi}{4}\right)$ by using a unit circle (provided separately).



Find $\cos(-8\pi/3)$



Find $\sin(9\pi/4)$

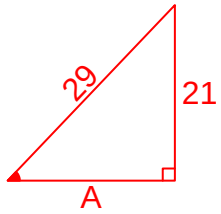
$\cos(-8\pi/3) = \frac{-1}{2}$

$\sin(9\pi/4) = \frac{\sqrt{2}}{2}$

Question 3

If $\sin(\theta) = \frac{-21}{29}$, and θ is in quadrant III, determine an exact value for $\cos(\theta)$.

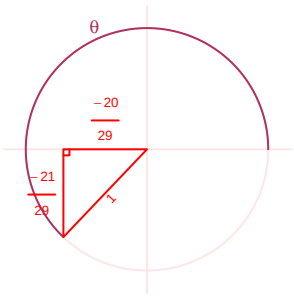
Ignore any negatives and the quadrant, and draw a right triangle (based on SOHCAHTOA) in standard (quadrant I) orientation.



Solve the Pythagorean Equation

$$A^2 + 21^2 = 29^2$$
$$A = \sqrt{29^2 - 21^2}$$
$$A = 20$$

Rescale the triangle so the hypotenuse is 1. Reflect the triangle into Quadrant III in a unit circle.



$$\cos(\theta) = \frac{-20}{29}$$

Question 4

A mass-spring system oscillates vertically with a midline at $y = -3.97$ meters, an amplitude of 7.44 meters, and a frequency of 5.67 Hz. At $t = 0$, the mass is at the midline and moving down. Write an equation to model the height (y in meters) as a function of time (t in seconds).

Any of these equations would get full credit.

$$y = -7.44\sin(2\pi 5.67t) - 3.97$$

or

$$y = -7.44\sin(11.34\pi t) - 3.97$$

or

$$y = -7.44\sin(35.63t) - 3.97$$